OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B642/01

CHEMISTRY B

Unit 2 Modules C4 C5 C6 (Foundation Tier)

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Wednesday 16 June 2010
Morning

Duration: 1 hour

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The Periodic Table is printed on the back page.
- This document consists of **24** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module C4

1 Sea-water contains many different ions.

Look at the table. It shows some of the ions in sea-water.

ion	formula	percentage by mass in sea-water
chloride	Cl^-	55.0
magnesium	Mg^{2+}	3.7
potassium	K^+	1.1
sodium	Na^+	30.6
sulfate	SO_4^{2-}	7.7

(a) (i) Which **positive** ion has the **greatest** percentage by mass in sea-water?

Choose from the ions in the table.

answer ..... **[1]**

(ii) Silver nitrate solution is used to test for halide ions.

Which ion in sea-water is a halide ion?

Choose from the ions in the table.

answer ..... **[1]**

(b) Katharine wants to test for sulfate ions in sea-water.

Which one of these solutions should she use?

Choose from the list.

barium chloride

dilute sulfuric acid

sodium hydroxide

sodium nitrate

answer ..... **[1]**

(c) Sea-water has a pH value of 8.

(i) What does this tell you about sea-water?

Choose from:

it is acidic

it is neutral

it is alkaline

answer ..... **[1]**

(ii) Ryan wants to show that sea-water has a pH of 8.

He does some research on the internet. Ryan finds out he can use a pH meter.

Describe one **other** way Ryan can find out the pH of sea-water.

.....

.....

.....

..... **[2]**

[Total: 6]

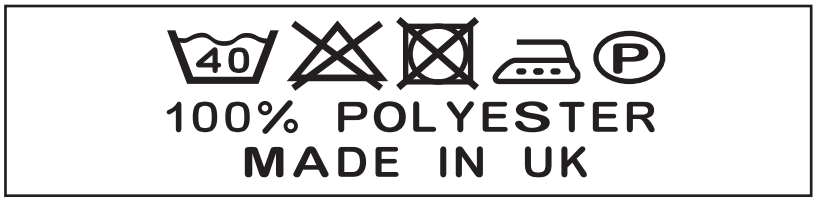
2 This question is about washing clothes.

Kieran wants to wash his dirty shirt.

Kieran's shirt has several food stains.

He decides to use a biological washing powder that contains enzymes.

He looks at the wash label on his shirt.



(a) What temperature should he choose to wash his shirt?

Explain your answer.

temperature .....°C

explanation .....

.....

..... **[2]**

(b) The washing powder also contains an optical brightener and a bleach.

(i) What is the job of the optical brightener?

.....

..... **[1]**

(ii) What is the job of the bleach?

.....

..... **[1]**

[Total: 4]

3 Medicines and pharmaceutical drugs are speciality chemicals.

(a) Digitalis is a medicine used to treat heart disease.

Digitalis can be extracted from the foxglove plant.

Describe how chemicals such as digitalis can be extracted from plants.

.....

.....

.....

..... **[2]**

(b) Statins are speciality chemicals.

They are medicines used to reduce cholesterol levels.

Many statins are made in a **batch** process.

(i) What is a batch process?

.....

..... **[1]**

(ii) Several factors affect the cost of making and developing a speciality chemical.

One factor is the cost of the energy used.

Write down two **other** factors.

1 .....

2 ..... **[2]**

[Total: 5]

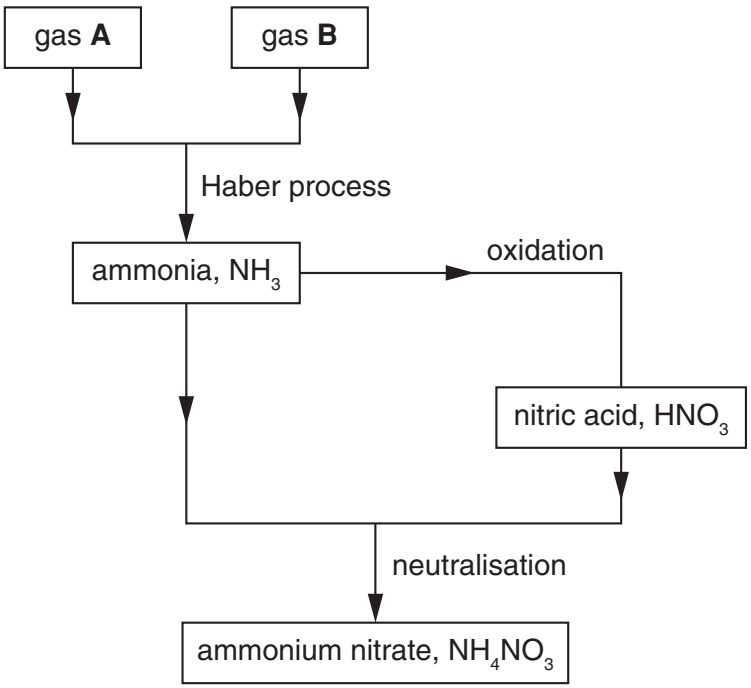
4 Ammonium nitrate is a fertiliser used by farmers.

(a) Why do farmers use fertilisers?

.....

..... **[1]**

(b) Look at the flow chart. It shows how ammonium nitrate can be made from ammonia.



Write down the **names** of the two gases needed to make ammonia.

Gas **A** is .....

Gas **B** is ..... **[1]**

(c) A factory makes ammonium nitrate.

Jordan predicts the factory should make 50 tonnes of ammonium nitrate.

The factory actually makes 37.5 tonnes of ammonium nitrate.

What is the percentage yield?

.....

.....

.....

percentage yield = ...% **[2]**

(d) Ammonium nitrate has the formula NH_4NO_3.

How many nitrogen atoms are there in the formula?

Choose from:

1 **2** **7** **9** **14** **28**

answer ..... **[1]**

[Total: 5]

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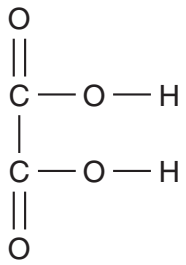
Section B – Module C5

5 Research chemists have isolated a weak acid from the leaves of rhubarb.

Look at the displayed formula of the weak acid.



(a) (i) How many different **elements** are there in the weak acid?

..... **[1]**

(ii) What is the molecular formula of the weak acid?

..... **[1]**

(b) Chris dissolves some of the weak acid in water.

He tests the pH of the solution.

The pH value is 3.5.

(i) Chris adds litmus to the solution of the weak acid.

What colour does Chris see?

..... **[1]**

(ii) The weak acid ionises in water.

Which **one** of the following ions is present in the solution?

Choose from:

CO_3^{2-} HCO_3^- H^- H^+ H_2^+

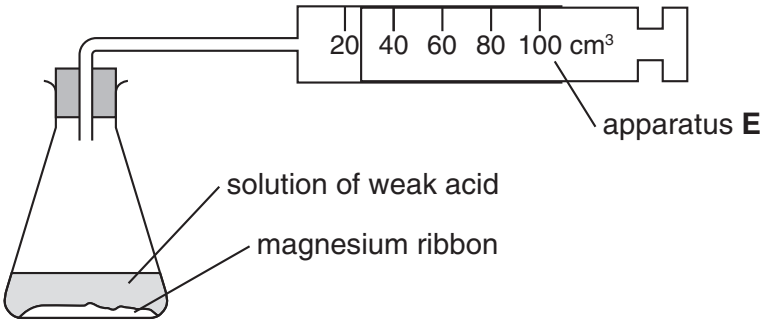
answer ..... **[1]**

(c) Chris investigates the reaction of a dilute acid with magnesium ribbon.

He adds a small amount of magnesium ribbon to 50 cm^3 of the acid.

He measures the volume of hydrogen every 10 seconds.

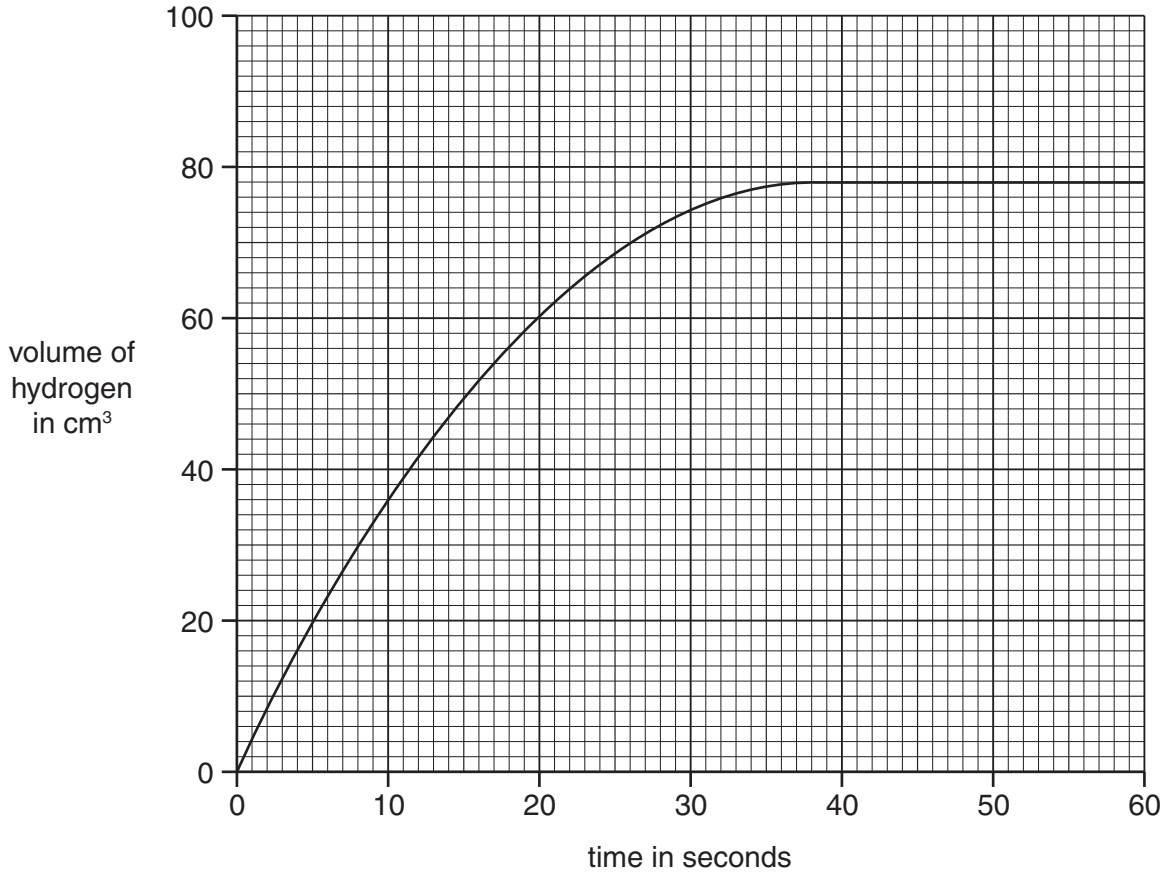
Look at the apparatus he uses.



What is the name of the apparatus labelled **E**?

..... **[1]**

(d) Look at the graph of Chris' results.



(i) What is the volume of hydrogen made after 20 seconds?

..... cm^3 **[1]**

(ii) After what time did the reaction stop?

..... seconds **[1]**

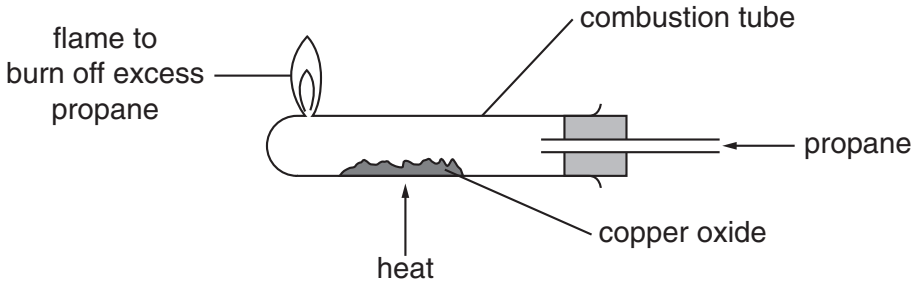
(iii) Suggest why the reaction stops.

.....

..... **[1]**

[Total: 8]

6 Alyce investigates a sample of copper oxide. Look at the apparatus she uses.



Alyce puts 2.88 g of copper oxide into the combustion tube.

Alyce passes propane gas over the heated copper oxide.

After 20 minutes she makes 2.56 g of copper.

(a) During the reaction all the oxygen in the copper oxide is removed.

What mass of oxygen was in the sample of copper oxide?

.....

.....

mass of oxygen = ... g **[1]**

(b) Alyce repeats the experiment.

This time she uses **5.76 g** of copper oxide instead of **2.88 g**.

What mass of copper should Alyce make?

.....

.....

mass of copper = ... g **[1]**

(c) Propane has the formula, C_3H_8.

Calculate the molar mass of propane.

The relative atomic mass, A_r, of H is 1 and of C is 12.

.....

.....

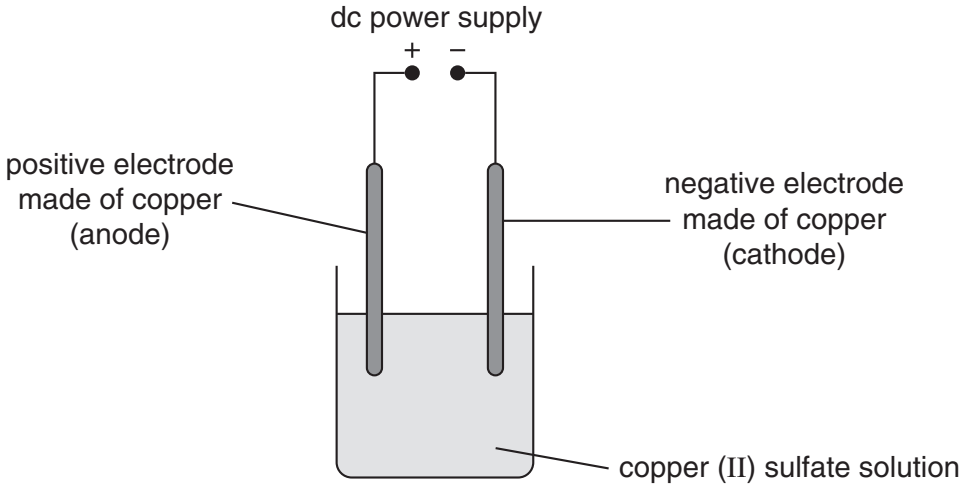
molar mass = ... g/mol **[1]**

[Total: 3]

7 This question is about the electrolysis of copper(II) sulfate solution.

Look at the diagram.

Jess uses this apparatus to electrolyse copper(II) sulfate solution.



(a) Look at the list of particles found in copper(II) sulfate solution.

Cu^{2+} H^+ H_2O OH^- SO_4^{2-}

(i) Which particle is a molecule?

Choose from the list.

answer ..... **[1]**

(ii) Some particles are attracted to the negative electrode.

Choose one from the list.

answer ..... **[1]**

(b) Jess finds the mass of the copper electrodes before and after doing the electrolysis.

What happens to the mass of each electrode during the electrolysis?

mass of negative electrode .....

.....

mass of positive electrode .....

..... **[2]**

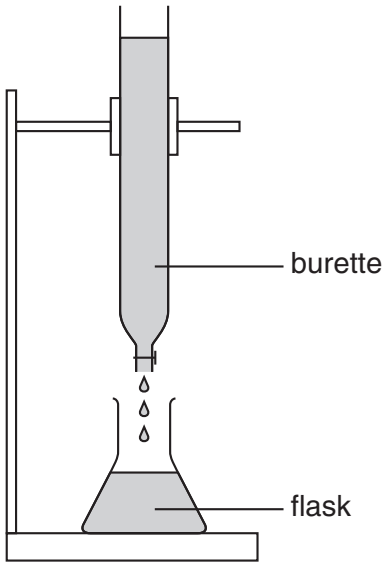
[Total: 4]

8 Matt wants to find the concentration of some dilute nitric acid.

He decides to do an acid-base titration.

Look at the diagram.

It shows some of the apparatus he uses.



Matt uses nitric acid and potassium hydroxide solution.

He uses phenolphthalein as an indicator.

(a) Describe how Matt does his acid-base titration.

Include any measurements he should make.

.....

.....

.....

.....

..... **[3]**

(b) Matt finds out that the nitric acid is too concentrated.

How can Matt dilute the nitric acid?

.....

..... **[1]**

(c) Nitric acid is a **strong** acid.

Write down the name of **one other** strong acid.

..... **[1]**

[Total: 5]

Section C – Module C6

9 This question is about CFCs.

The molecular formula of one CFC is CF_2Cl_2.

(a) (i) Write down the **names** of the **three** elements in **CF_2Cl_2**.

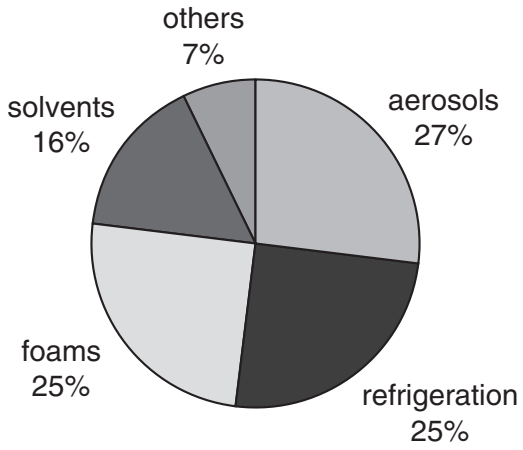
You may use the Periodic Table on the back page to help you.

..... **[1]**

(ii) Write down the total number of **atoms** in a molecule of **CF_2Cl_2**.

answer ..... **[1]**

(b) The pie chart shows the uses of CFCs in 1986.



(i) One product used the **highest** percentage of CFCs in 1986.

Which one?

..... **[1]**

(ii) CFCs were used in aerosols.

Suggest one suitable safe alternative for CFCs.

..... **[1]**

(c) CFCs in the atmosphere decrease the ozone layer.

This is called ozone depletion.

Ozone depletion causes more ultraviolet light to reach the Earth's surface.

Write down **two** medical problems which can be caused by an increase in levels of ultraviolet light.

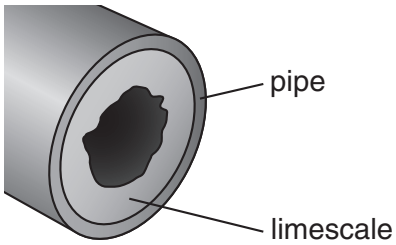
1 .....

2 ..... **[2]**

[Total: 6]

10 Hot water pipes are often coated with limescale.

Look at the picture of a hot water pipe.



(a) Limescale is made when hard water is heated.

Which of the following can be used to remove hardness from water?

Choose from the list.

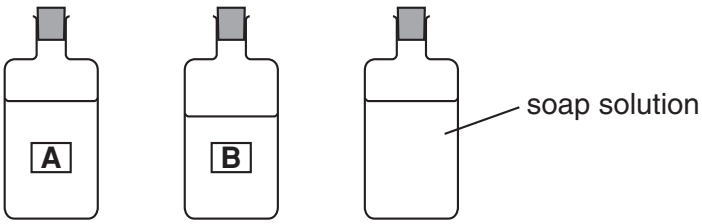
catalyst **ion-exchange resin** **magnesium sulfate**

answer ..... **[1]**

(b) Bev and Jeff bring in two water samples, **A** and **B**.

They want to find out which has the most hardness.

They use soap solution in their experiment.



Write about how they do their experiment.

Your answer should include

- the apparatus they use
- the measurements they take
- how they tell which sample of water has the most hardness.

.....

.....

.....

.....

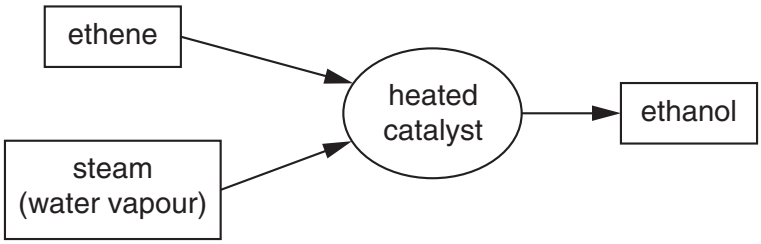
.....

..... **[3]**

[Total: 4]

11 This question is about ethanol.

Look at the flow chart. It shows how ethanol is made from ethene.



(a) (i) Write down the **word** equation for making **ethanol** from ethene.

..... **[1]**

(ii) Look at the list. It shows some different types of chemical reactions.

Which reaction type is used to make ethanol from ethene?

Choose from the list.

dehydration

electrolysis

hydration

saponification

answer ..... **[1]**

(iii) **Ethene** can be made from ethanol.

Write down **one** condition for this reaction.

.....

..... **[1]**

(b) Ethanol can be made from glucose solution and yeast.

This reaction is called fermentation.

Fermentation makes a solution of ethanol.

What is the name of the process used to obtain ethanol from this solution?

..... **[1]**

[Total: 4]

12 This question is about metals.

(a) Some iron objects are covered with tin to stop them rusting.

Write down **two** other methods used to stop iron from rusting.

1 .....

2 ..... **[2]**

(b) Look at the table of results.

It shows what happens when a metal is put into a solution.

solution used	**metal being added**		
	iron	**tin**	**zinc**
iron sulfate		×	✓
tin sulfate	✓		✓
zinc sulfate	×	×	

× means that nothing happens

✓ means that the metal gets coated

Write down the **three** metals, iron, tin and zinc, in order of reactivity.

Use the table of results to help you.

most reactive metal .....

.....

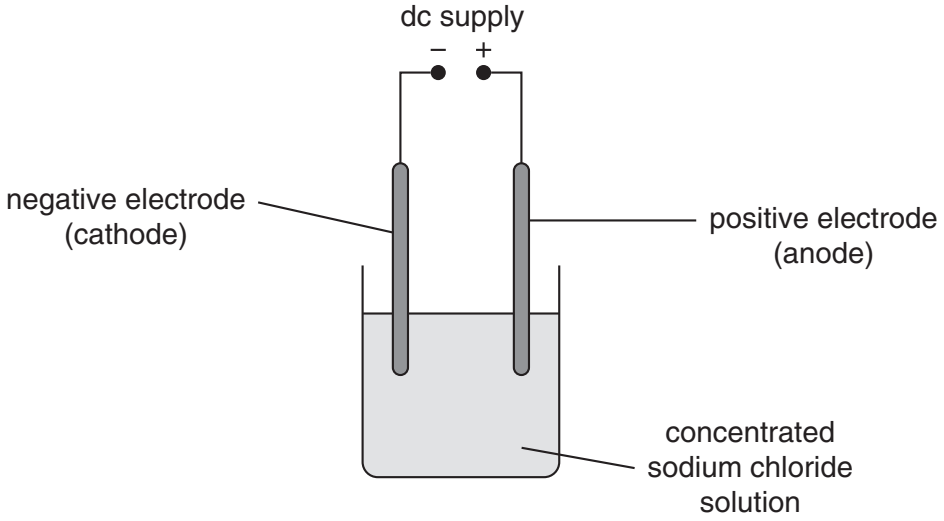
least reactive metal ..... **[1]**

[Total: 3]

13 This question is about electrolysis and fuel cells.

(a) Ahmed investigates the electrolysis of concentrated sodium chloride solution.

Look at the apparatus he uses.

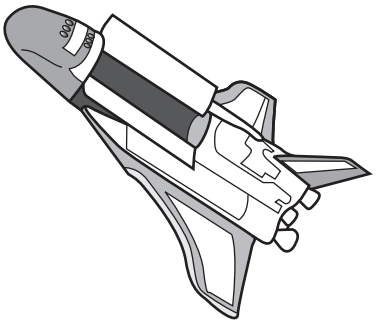


Hydrogen gas is made at the cathode.

Write down the **name** of the gas made at the **anode**.

..... **[1]**

(b) The picture shows a spacecraft that uses a fuel cell.



In a fuel cell hydrogen reacts with oxygen.

Water is the only product.

(i) Hydrogen is a pollution-free fuel.

Write down **one** reason why.

..... **[1]**

(ii) Fuel cells produce energy.

Look at the list. It shows different types of energy.

electrical **heat** **kinetic** **sound**

What is the type of energy produced by a fuel cell?

Choose from the list.

answer ..... **[1]**

[Total: 3]

END OF QUESTION PAPER

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The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.